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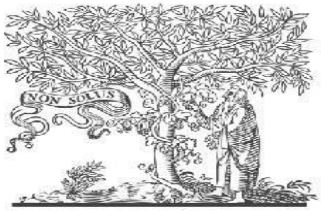

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AI-Based Transportation System for Detecting and Preventing Accidents

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ABSTRACT-Road accidents are increasing quickly in developing countries like India as transportation technology and vehicle numbers progress. Every year, there are more motor vehicles on the road, giving us more chances to drive. Advancements in Advanced Safety Vehicles research and development (ASVs) are carried out to incorporate cutting-edge knowledge into novel vehicles, protecting drivers while preventing damage to other vehicles and pedestrians. In this article, we suggest using sensor technologies to identify moving vehicles and gauge their speed and range. With the use of Bluetooth technology and the Controller Area Network, this device not only warns the driver but also prevents accidents by automatically braking the vehicle and any nearby other vehicles.

Keywords: Road accidents, Advanced Safety Vehicles (ASVs), Controller Area Network (CAN), ABS, AITS .

I. INTRODUCTION

A vehicle with accident-prevention technology is known as a "ASV". It contains sensors that can identify potential danger and communicate with other vehicles about its speed and location. We'll introduce to you some of the presently used technologies as well as some upcoming ones. At the moment, hundreds of lives are lost each year in accidents that are mostly the result of human mistakes in judgment. If only there were a system in place to warn drivers when danger was about to arrive, these accidents could be averted.

Vehicular Communication Systems are a new class of systems in which roadside equipment and moving automobiles serve as the communication nodes, exchanging data like traffic and safety alerts. Traffic congestion and crashes can be avoided more successfully with vehicular communication systems than they would be if each vehicle tried to handle these problems on its own. Typically, the development of vehicular communications is a component of AI-based Transport Systems (AITS). Through AI-based transportation that incorporates message among mobile and fixed nodes, AITS aims to increase productivity and safety. AITS heavily rely on wired and wireless connections to achieve this.

Road safety is still a significant development issue, a public health issue, and a major global cause of death and injury. According to the World Health Organization, at least one out of every ten individuals

killed on roads around the world is an Indian. The fact that we haven't made much progress on this front despite the government's ongoing efforts in this area and our goals to halving deaths is, in fact, extremely concerning.

Road accidents claimed 1,53,982 lives and injured 3,94,455 people in the country in 2021, according to reports of 5,12,442 accidents. Sadly, Accidents have the greatest impact on people between the ages of 18 and 50, who make up about 66 percent of any and all accidental fatalities. In order to raise public awareness of the issue of road safety, the Ministry of Road Transport and Highways has conducted a number of programmes, including those related to road and vehicle engineering. The Ministry has begun putting the Motor Vehicle (Amendment) Act 2019 into effect. This long overdue revision was made approximately 30 years ago to address the demands of the evolving transportation infrastructure and environmental situation.

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Through its organizations like NHAI and NHIDCL, the Ministry has also been working on detecting Black Spots on National Highways and on the short- and long-term correction of these black spots. Additionally, the Ministry has been publishing a yearly book named "Road Accidents in India" to meet this requirement. Although increased safety is the primary benefit of vehicular networks; there are a number of additional advantages. By processing real-time data, vehicular systems can assist in avoiding traffic and locating better routes. This results in fuel and time savings and has major financial benefits.

II. SENSOR FOR ACCIDENT PREVENTION

The likelihood that everyday auto accidents may one day be terrible relics of the past increases as road safety technology advances. This does not mean that there will be no more car accidents; rather, it means that their frequency and severity will be reduced to the point where they are statistically rare. Recently, a number of technical breakthroughs that show promise have been made, paving the way for future strategies to avoid auto accidents. The Sensory Detector is one of these suggested technical advancements. By determining how close a motor is to the automobile in front and adjusting the speeds to a threshold which would reduce the chance of a traffic collision, the sense detection will work.

A. Sensors to control the vehicle

The gadget aids drivers in preventing collisions by alerting them to the presence of oncoming cars, motorcycles, and pedestrians and regulating their speed and following distance.

B. Mechanical problem warning system.

By monitoring the conditions of the vehicle, this device provides a warning before a mechanical failure or accident happens.

C. Blind area warning system

This gadget monitors the surroundings as the automobile is going right or left or backing up and, if necessary, warns the drivers. This technique can stop mishaps where surrounding objects are involved. Anti-lock braking system (ABS) , is used to prevent accidents brought on by skidding.

D. Driver hazard warning (avoidance) system

This technology sounds a bell to notify the driver when it detects their tiredness or the effects of alcohol on their movements. If there is any additional risk, it will drive the car or automatically stop it.

E. Airbags, Seat belts, and simple to use transportation

Improve the effectiveness of airbags and seat belts to reduce accidents. Research is also being done on ways to make meters easier to operate or see, which would ease the stress on drivers.

F. Protection against pedestrian injuries

Airbags that can detect and deploy in the event of a collision with a pedestrian are currently the subject of research. In order to protect pedestrians, investigation is also being done on the shape and construction of motors.

G. Method for absorbing shock

The analysis of a mechanism to prevent cars from swerving under heavy trucks or flipping over during collisions is crucial to the prevention of major accidents.

H. Automatic fire extinguisher and automatic mayday system

When an accident happens, automated fire extinguishing and notification of the police and fire station are carried out.

III. VEHICULAR COMMUNIQUÉ

` The desire to adapt is what largely drives vehicular communication Artificial Intelligent based Transport Systems (AITS), which have significant advantages in terms of safety and simplicity of travel. To translate AITS concepts into practical applications, numerous AITS institutions are active worldwide. U.S. Department of Transportation (US DoT) is one of the major stakeholders in this country. The government DoT supports AITS by investing in projects with a high likelihood of success. One of these significant programmes, Vehicle Infrastructure Integration (VII), uses Dedicated Short Range Communications (DSRC)to enable vehicle-to-vehicle and vehicle-to-roadside unit communications in an effort to boost safety.

Outlines for vehicle networks are provided by two groups of draught standards. These specifications make up the Wireless Access in Automotive Environments (WAVE) category of IEEE standards, which governs an exclusive IEEE 802.11 mode of operation for vehicular networks. 802.11p is a

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Medium Access layer (MAC) and physical layer (PHY) extension for the 802.11 Wireless LAN protocol. Draft 1.3 of this standard has been approved as of November 2006. 802.11p strives to offer the MAC and PHY layer specifications required for the unique requirements of vehicle networks. Among the topics covered by the IEEE 1609 family of standards are network administration and security:

Vehicle to vehicle, or V2V, is a term used to describe a technology that enables vehicles to "speak" to one another. The systems will utilize a portion of the unlicensed 5.9 GHz band, which is the same frequency that Wi-Fi operates on and was set aside by the US Congress in 1999. These standards are currently being tested. A record of these applications is speculative and likely to modify in the outlook because these networks have not yet been implemented. The channels are split into two types by standards: control channels and service channels. A little of these applications also make use of unobtainable technologies.

A. Vehicle to Roadside or V2VCommunication

Eight different devices can be in communication with a Bluetooth device at once. Eight nearby cars' speeds can be concurrently monitored and checked, preventing accidents. Therefore, if two Bluetooth-enabled devices are present in two different cars, they will immediately start communicating when they are within a range of up to 100 meters. With a nominal antenna power of 20 dB, the Bluetooth radio is a short-range, low-power radio that operates in the unlicensed 2.4 GHz band. Gaussian frequency shift keying, which represents zeros by low frequency and ones by high frequency, is the modulation method used in Bluetooth.

The car receives a warning signal from the Bluetooth gadget when any two cars are about to collide. Based on the type of alert these have obtained, a warning is sent by the corporation to the brake control system, which causes the vehicle's speed to be reduced.

B. Communication among controllers, actuators and sensors

CAN was initially created by automotive systems, where numerous tiny sensors needed to regularly account tiny values. Each node in CAN, which is a multi-master network, is free to communicate data whenever it wants. Priority determines how a collision is handled. The arbitration process is won and the message with the smallest message identification passes. An 12-bit message identity and a 16-bit CRC are included in each message's overhead. Because every node confirms the CRC, CAN is extremely secure and reliable and messages can contain up to 50% overhead. All other nodes automatically delete the message and retransmit it if a sole node reports a CRC error. The max network length is determined by the network speed used, and the distinctive physical medium is a warped couple of wires. The longest length at 1Mbps is around 40m/120ft. Lower speeds enable travel across greater distances.

IV. AUTOMATIC BRAKING SYSTEM

The Automatic braking system for regulating vehicle speed is the automated brake system. The car's computer modifies the control signal after receiving it from the moving vehicle and the brake system receives it.

Whenever it notices a closest point, the controller adjusts the mechanical valves to increase the pressure on the brake circuit, hence raising the braking force applied to the wheels. The controller continually monitors the spacing between each of these autos. If two vehicles having 100 m of distance among them, Bluetooth device are active, as well as the automatically braking system will be active if the distance is 10 meters among motors.

A. Electronic Wedge Brake System

An electronic wedge brake has an automatic transfer mechanism, two e-motors for precise control, sensors to monitor forces, and a control unit with a brake pad on each wheel for each wheel. Four sensors in all measure the rotation of the wheels, determining the vehicle's speed, the force acting on the brakes, and the wedge's position about 100 times each second. When the driver applies the brakes, the wheels in the system receive the force electromechanically and electrically. Based on sensor readings and the driver's instruction to brake, the two e-motors move the brake pad over a number of rollers over a sloped surface the actual wedge. The pressure point of the brake pad is determined by the location of the rollers on the incline. When the disc comes into contact with the pad, immediately brake. Once a significant amount of braking moment is generated by increasing frictional

forces, the e-motors either hold the brake pad in place or move it back over roller bearing and into an optimal situation. The response times are measured in milliseconds, and in the micrometers its involve with distance only matters. The 12-V onboard network of the car is ideal for powering the electric motors.

EWB uses only a fraction of the actuation energy needed by hydraulic braking systems now in use. Additionally, it reacts much more quickly. Because of its greatly increased efficiency, the EWB will also be smaller in size and lighter overall. Additionally, the lack of brake pedal, a brake control unit, and a tank for braking fluid will free up roughly 23 liters of capacity in the engine bay, allowing for greater flexibility. The EWB technology would make it feasible to brake a trailer more swiftly and carefully. This innovative technique can theoretically be used to brake any wheeled vehicle, including high-speed trains, vehicles currently employ costly, maintenance-intensive brakes.

A. Anti Lock Braking system(ABS technique)

Four wheel speed sensors, an electronic central processing unit (ECU), at least two brake hydraulic valves, and an ABS are standard components. The ECU continuously tracks the rotational speed of each wheel; if it notices one rotating noticeably more slowly than the others, a sign of impending wheel lock, it activates the valves to reduce hydraulic pressure to the brake at the affected wheel, reducing the braking force on that wheel, causing the wheel to turn faster. In contrast, if the ECU notices a wheel turning noticeably more quickly than the rest, brake hydraulic pressure is increased to the wheel, reapplying braking power to the wheel and slowing it down. The driver can observe this process happening continuously by emotion the brake pedal pulse. Some anti-lock systems have the capacity to brake 16 times per second.

An ABS is made up primarily of 4 divisions:, a pump, speed sensors , a controller and valves. The speed sensors are constantly being watched by the controller. It searches for unusual decelerations in the wheel's motion. The moment before the wheel locks up, there is going to be sudden deceleration. If left unrestrained, the wheel will come to a complete halt much quicker than any other motor could. An automobile could stop from 60 miles per hour (96.6 km/h) in five seconds under ideal conditions, whereas a locked wheel might stop spinning in just one. The ABS system recognizes to such a deceleration is not possible; therefore it lowers the pressure on that brake until it detects acceleration before increasing it awaiting it detects another rapid slowdown. The exhaust may do this very quickly, before it actually experiences a big shift in speed. The tyre slows down in tandem with the vehicle because the brakes keep them extremely close to the point when they will begin to lock up. The system has reached its maximum level of braking power. The brake pedal will pulse when the ABS system is engaged; this is caused by the fast opening and closing of the valves. The driver can also learn that the ABS has been activated from this pulsing. Some ABS systems have a 16 second cycle rate.

V.CONCLUSION

Even though automatic roads aren't yet commonplace, they are an essential application. Vehicles can travel on these highways without the help of their drivers. To safely guide cars, we need a system on the roads that makes use of devices and transmitters to communicate and receive data and indicators about the status of the traffic and roads. Modern automotive routing systems have improved. In the outlook, they could map us to the route that gets us there the quickest while avoiding traffic and accidents. Vehicle collaboration is used to accomplish this. For example, by communication with them, each vehicle is aware of the speed and direction of the motion of its nearby cars. Since the rank is often modernized, every vehicle can forecast the future to the extent that is necessary and is able to make the proper judgments at the proper moment. Automated roadways will be able to travel at considerably faster speeds with very few accidents since they are not constrained by human response time.

REFERENCES

[1] Car-to-Car Communication Consortium,-C2C-CC Manifesto, Version 1.1,‖ August 2007,
[2]Vehicle Infrastructure Integration (VII),‖ http://www.its.dot.gov/vii/
[4]http://en.wikipedia.org/wiki/Vehicular Communication Systems

[5]http://en.wikipedia.org/wiki/Anti-lock_braking_ system.
[6]http://electronicsbus.com/steer-by-wire-electronic-steering-control-system-design-steering-sensors-actuators-intelligent-vehicles/
[7]http://www.youclaim.co.uk/Anti-car crash technologies innovations.htm
[8] SSRG International Journal of Industrial Engineering (SSRG-IJIE) – Volume 4 Issue 1 – Jan to April 2017
[9]http://www.transport-pf.or.jp/english/riku/11 mirai.html
[10] Vehicle-To-Vehicle And Road-Side Sensor Communication For Enhanced Road Safety - Andreas Festag, Alban Hessler, Roberto Baldessari,Long Le, Wenhui Zhang, Dirk Westhoff
[11] www.tpapers.blogspot.com/ accident prevention using wireless communication.
[12] International Journal of Computer Applications (0975 – 8887) Volume 182 – No. 7, August 2018.